



(PA) 1
PATENT
P56907

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Rajan A. JAISINGHANI

Serial No.: 10/618,457

Examiner: Chiesa, Richard L

Filed: 15 February 2005

Art Unit: *to be assigned*

For: LOW PRESSURE DROP DEEP ELECTRICALLY ENHANCED FILTER

INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
P.O.Box 1450
Alexandria, VA 22313-1450

Sir:

This is a resubmission of the Information Disclosure Statement filed on 7 August 2003 to the Examiner's request. In accordance with 37 C.F.R. §§ 1.56, and 1.97 and 1.98, Applicant cites and provides copies and briefly discuss the following references and documents:

| | <u>U.S. PATENTS</u> | <u>NAME</u> | <u>DATE</u> |
|----|---------------------|-------------|-------------|
| 1. | 2,352,651 | Meston | 07/1944 |
| 2. | 2,789,657 | Fields | 04/1957 |
| 3. | 2,798,572 | Fields | 07/1957 |
| 4. | 3,910,779 | Penney | 10/1975 |

Folio: P56907
Date: 2/15/05
I.D.: REB/mn/kf

| | | | |
|-----|-----------|--------------------|---------|
| 5. | 3,979,189 | Alskog | 09/1976 |
| 6. | 4,018,577 | Shibuya et al. | 04/1977 |
| 7. | 4,266,948 | Teague et al. | 05/1981 |
| 8. | 4,317,661 | Sasaoka et al. | 03/1982 |
| 9. | 4,357,150 | Masuda et al. | 11/1982 |
| 10. | 4,509,958 | Masuda et al. | 04/1985 |
| 11. | 4,715,870 | Masuda et al. | 12/1987 |
| 12. | 4,750,921 | Sugita et al. | 06/1988 |
| 13. | 4,781,736 | Cheney et al. | 11/1988 |
| 14. | 4,853,005 | Jaisinghani et al. | 08/1989 |
| 15. | 4,940,470 | Jaisinghani et al. | 07/1990 |
| 16. | 5,185,015 | Searle | 02/1993 |
| 17. | 5,403,383 | Jaisinghani | 04/1995 |

OTHER DOCUMENTS

1. Jaisinghani, et al., "Advantages of Electrically Stimulated Air Filtration Over Conventional Filtration", *Fluid Particle Separation Journal*, Vol. 1, No. 2, Dec. 1998 pgs. 99-102.
2. Jaisinghani, et al., "Effect of Relative Humidity on Electrically Stimulated Filter Performance", *APCA Journal*, Vol. 37, Jul. 1987, pgs. 823-828.
3. Jaisinghani, et al., "Performance Characteristics of a Two Electrode Ionizing Electrically Stimulated Filter", Annual Meeting of the Fine Particle Society, Jul. 1988, Santa Clara, California.

4. Jaisinghani, "Go With The Flow: A Discussion of Energy Efficient Airflow Design for Cleanrooms" *The European Journal of Contamination Control Cleanroom Technology Magazine*, January 2002.
5. Jaisinghani, "High Filtration/Biocidal Performance Cleanroom System" Presented at Cleanrooms 96' West The Conference on Advanced Microcontamination Control and Ultrapure Manufacturing, Santa Clara Convention Center, Santa Clara, California, October 28-30, 1996.
6. Jaisinghani, "Air Handling Considerations for Efficient Cleanroom Design" For Cleanrooms, January 2001 issue.
7. Jaisinghani, "Air Handling Considerations for Cleanrooms", Presented at the 2001 InterPhex Conference, Philadelphia, Pennsylvania, March 20-22, 2001.
8. Rajan Jaisinghani, "New Bactericidal Electrically Enhanced Filtration Systems For Cleanrooms", Presented at the IEST's 44th Annual Technical meeting and exposition in Phoenix, Arizona, April 26-May 1, 1998.
9. Jaisinghani, "Air Handling Considerations for Cleanroom Design", Presented at Cleanrooms East 2002, Boston, Massachusetts, March 12-14, 2001.
10. Jaisinghani, "Energy Efficient Cleanroom Design Power Point Presentation", For Technocation Systems, Inc., July 2001.

DISCUSSION

U.S. Patent No. 2,789,657 to Fields, entitled Electrostatic Precipitators.

U.S. Patent No. 2,352,651 to Meston, entitled Manufacture of Electrode.

U.S. Patent No. 2,798,572 to Fields, entitled Electrostatic Precipitators.

U.S. Patent No. 3,910,779 to Penney discloses an electrostatic dust filter for forming a relatively porous layer of dust particles upon a filter surface such that effective filtering with a low pressure drop is obtained. The Penney '779 device utilizes an electric field created by a two electrode scheme in which a filter lies between a conducting plate and a grounded metal support.

U.S. Patent No. 3,979,189 to Alskog discloses an electrostatic filter for preferably separating liquid droplets suspended in air. The Alskog '189 device utilizes a high voltage electrode connected to and surrounded by a cylindrical separation tube with filtering material surrounding the separation tube to draw particles with a fan across the tube to filter particles from the air.

U.S. Patent No. 4,018,577 to Shibuya et al. discloses a particle charging device for use in an electrostatic dust collecting apparatus for charging particles. The Shibuya et al. '577 device utilizes an upper charging section with five sets of electrodes excited by AC and DC power to charge dust particles before reaching a collection section consisting of field forming electrodes and collector electrodes on which the dust clings.

U.S. Patent No. 4,266,948 to Teague et al., entitled Fiber-Rejecting Corona Discharge Electrode and a Filtering System Employing the Discharge Electrode.

U.S. Patent No. 4,317,661 to Sasaoka et al. discloses an electric air cleaner which provides a discharge wire that is not exposed to dirty air such that dust does not accumulate onto the

discharge wire. The Sasaoka et al. '661 device utilizes a discharging wire and a grounded electrode placed out of the air flow and configured to produce an ion shower covering the air flow to charge dust particles before reaching a filter with a grounded net on its backside.

U.S. Patent No. 4,357,150 to Masuda et al., entitled High-Efficiency Electrostatic Air Filter Device.

U.S. Patent No. 4,509,958 to Masuda et al. discloses a high efficiency electrostatic filter device. The Masuda et al. '958 device utilizes a porous cover at intake, along with ionizing wires, spacer electrodes and grounded plate electrodes configured before a filtering device having separator electrodes sandwiched within it, to charge dust particles and subsequently filter them out of the air.

U.S. Patent No. 4,715,870 to Masuda, et al. discloses an electrostatic filter dust collector. The Masuda et al. '870 device utilizes a charging section consisting of a net member at the inlet, flat electrodes placed in parallel with the direction of air flow and discharge wires between the flat electrodes, to charge dust particles, and a dust collecting section which consists of a filter coated with conductive paint at its pleats, to absorb charged dust particles.

U.S. Patent No. 4,750,921 to Sugita et al. discloses an electrostatic filter dust collector. The Sugita et al. '921 device utilizes a charging section consisting of flat electrodes placed parallel with the direction of air flow and discharge wires between the flat electrodes, to charge dust particles, and a dust collecting section which consists of a filter with conducting spacers and insulating spacers in its pleats, to absorb charged dust particles.

U.S. Patent No. 4,940,470 to Jaisinghani et al. discloses single field ionizing electrically stimulated filter. The Jaisinghani et al. '470 device utilizes a blower to draw air through a prefilter

toward an ionizer and filter, which consists of an ionizing wire and a filter having a ground on its downstream side, to separate and trap charged particles from the air.

U.S. Patent No. 5,185,015 to Searle discloses filter apparatus.

U.S. Patent No. 4,853,005 to Jaisainghani et al. discloses electrically stimulated filter method and apparatus. The Jaisainghani et al. '005 device utilizes a pre-filter, a pre-charger and an electrically stimulated filter, in which air is passed through each component, respectively, to filter debris from the air.

U.S. Patent No. 4,781,736 to Cheney et al. discloses electrostatically enhanced HEPA filter. The Cheney et al. '736 device utilizes an ionizing section of a plurality of wire-like electrodes and grounded plate-like electrodes, arranged alternately in a parallel fashion, to charge incoming particles, and a filter section which contains two sets of conducting spacers, one set placed at the air entry side of the filter and the other set placed at the exit side of the filter, in which a field is created between each set of spacers by connecting one set to ground, to filter the previously charged particles from the incoming air.

U.S. Patent No. 5,403,383 to Jaisainghani discloses safe ionizing field electrically enhanced filter and process for safely ionizing a field of an electrically enhanced filter.

Jaisainghani, et al., "Advantages of Electrically Stimulated Air Filtration Over Conventional Filtration", discusses the advantage of electrically stimulated air filtration over conventional filtration, and discloses a two field electrically stimulated filter with a recharging device and filtration system, and a signal field ionizing electrically stimulated filter with a set of ionizing wires and a filter sandwiched between the ionizing wires and a ground potential.

Jaisainghani, et al., "Effect of Relative Humidity on Electrically Stimulated Filter

Performance", discloses an electrically stimulated filter, with or without a precharger, used in conjunction with a non-contacting air gap electrode design, such that current sensitivity with respect to relative humidity is reduced.

Jaisinghani, et al., "Performance Characteristics of a Two Electrode Ionizing Electrically Stimulated Filter", discloses a single field, two electrode ionizing electrically stimulated filter. The device utilizes ionizing wires placed upstream of a filter with a ground potential downstream of the filter to create a single ionization field to simultaneously charge particles in the air and separate them with the filter.

Jaisinghani, "Go With The Flow: A Discussion of Energy Efficient Airflow Design for Cleanrooms" discusses energy efficient airflow design for cleanrooms.

Jaisinghani, "High Filtration/Biocidal Performance Cleanroom System" pertains to a new electrically enhanced filter (EEF) and its application in non-recirculating and recirculating air flow clean room.

Jaisinghani, "Air Handling Considerations for Efficient Cleanroom Design" discusses re-evaluation of existing methods of airflow for an efficient cleanroom.

Jaisinghani, "Air Handling Considerations for Cleanrooms", also discusses re-evaluation of existing methods of airflow for an efficient cleanroom.

Rajan Jaisinghani, "New Bactericidal Electrically Enhanced Filtration Systems For Cleanrooms", pertains to an ionizing electrically enhanced filter (EEF) for clean rooms. The reference describes that the electrical enhancement process results in a) increased filtration efficiency at lower pressure drop and b) bactericidal effects.

Jaisinghani, "Air Handling Considerations for Cleanroom Design", illustrates issues that surround the cleanroom industry, such as; cleanroom airflow design has not changed in decades; the biggest factor affecting initial and operating cost is airflow; currently only simple charts are used methods without any technical basis; energy, cost and performance factors dictate a more technical approach; and a proposed rational approach.

Jaisinghani, "Energy Efficient Cleanroom Design Power Point Presentation", discloses, illustrates issues that surround the cleanroom industry, such as; energy consumption affects operating costs and has significant environmental impact and associated costs; the biggest factor affecting initial and operating cost is airflow; and cleanrooms use a lot of airflow.

This citation of foregoing references is not intended to constitute an assertion that Application has undertaken the search of the prior art. Accordingly, the Examiner is requested to take a wide-ranging and through search of the relevant art.

Respectfully submitted,



Robert E. Bushnell
Reg. No.: 27,774

1522 "K" Street, N.W.,
Suite 300
Washington, D.C. 20005
Area Code: 202-408-9040

Folio: P56907
Date: 2/15/05
I.D.: REB/kf

| | | | |
|----------------------------------|--|-------------------------------------|-----------------------------|
| INFORMATION DISCLOSURE STATEMENT | | SERIAL NUMBER <i>to be assigned</i> | DOCKET NO. P56907 |
| PTO-1449 PAGE 1 OF 2 | | APPLICANT Rajan A. Jaisinghani | |
| | | FILING DATE 7 August 2003 | GROUP <i>to be assigned</i> |

FEB 15 2005
U.S. PATENT AND TRADEMARK OFFICE

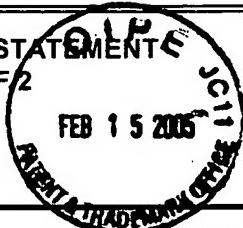
| U.S. PATENT DOCUMENTS | | | | | | |
|-----------------------|-----------------|----------|--------------------|-------|----------|-------------|
| EXAMINER | DOCUMENT NUMBER | DATE | NAME | CLASS | SUBCLASS | FILING DATE |
| | 3,910,779 | 10/7/75 | Penney | | | |
| | 3,979,189 | 9/7/76 | Alskog | | | |
| | 4,018,577 | 4/19/77 | Shibuya et al. | | | |
| | 4,317,661 | 3/2/82 | Sasaoka et al. | | | |
| | 4,509,958 | 4/9/85 | Masuda et al. | | | |
| | 4,715,870 | 12/29/87 | Masuda et al. | | | |
| | 4,940,470 | 7/10/90 | Jaisinghani et al. | | | |
| | 5,185,015 | 2/9/93 | Searle | | | |
| | 4,853,005 | 8/1/89 | Jaisinghani et al. | | | |
| | 4,781,736 | 11/1/88 | Cheney et al. | | | |
| | 4,750,921 | 6/14/88 | Sugita et al. | | | |
| | 5,403,383 | 4/4/95 | Jaisinghani | | | |

OTHER DOCUMENTS (*Including Author, Title, Date, Pertinent Pages, etc.*)

| | |
|--|--|
| | Jaisinghani, et al., "Advantages of Electrically Stimulated Air Filtration Over Conventional Filtration", <i>Fluid Particle Separation Journal</i> , Vol. 1, No. 2, Dec. 1998 pgs. 99-102. |
| | Jaisinghani, et al., "Effect of Relative Humidity on Electrically Stimulated Filter Performance", <i>APCA Journal</i> , Vol. 37, Jul. 1987, pgs. 823-828. |
| | Jaisinghani, et al., "Performance Characteristics of a Two Electrode Ionizing Electrically Stimulated Filter", Annual Meeting of the Fine Particle Society, Jul. 1988, Santa Clara, California |

| | |
|---|------------------|
| EXAMINER: | DATE CONSIDERED: |
| EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP §609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. | |

INFORMATION DISCLOSURE STATEMENT
PTO-1449 PAGE 2 OF 2



| | | | |
|---------------|----------------------|------------|----------------------|
| SERIAL NUMBER | to be assigned | DOCKET NO. | P56907 |
| APPLICANT | Rajan A. Jaisinghani | | |
| FILING DATE | 7 August 2003 | | GROUP to be assigned |

U.S. PATENT DOCUMENTS

| EXAMINER | DOCUMENT NUMBER | DATE | NAME | CLASS | SUBCLASS | FILING DATE |
|----------|-----------------|-------|---------------|-------|----------|-------------|
| | 2,789,657 | 04/57 | Fields | | | |
| | 2,352,651 | 07/44 | Meston | | | |
| | 2,798,572 | 07/57 | Fields | | | |
| | 4,357,150 | 11/82 | Masuda et al. | | | |
| | 4,266,948 | 05/81 | Teague et al. | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, etc.)

| | |
|--|---|
| | Rajan Jaisinghani, "Go With The Flow: A Discussion of Energy Efficient Airflow Design for Cleanrooms" The European Journal of Contamination Control Cleanroom Technology Magazine, January 2002. |
| | Rajan Jaisinghani, "High Filtration/Biocidal Performance Cleanroom System" Presented at Cleanrooms 96' West The Conference on Advanced Microcontamination Control and Ultrapure Manufacturing, Santa Clara Convention Center, Santa Clara, California, October 28-30, 1996. |
| | Rajan Jaisinghani, "Air Handling Considerations for Efficient Cleanroom Design" For Cleanrooms, January 2001 issue. |
| | Rajan Jaisinghani, "Air Handling Considerations for Cleanrooms", Presented at the 2001 InterPhex Conference, Philadelphia, Pennsylvania, March 20-22, 2001. |
| | Rajan Jaisinghani, "New Bactericidal Electrically Enhanced Filtration Systems For Cleanrooms", Presented at the IEST's 44 th Annual Technical meeting and exposition in Phoenix, Arizona, April 26-May 1, 1998. |
| | Rajan Jaisinghani, "Air Handling Considerations for Cleanroom Design", Presented at Cleanrooms East 2002, Boston, Massachusetts, March 12-14, 2001. |
| | Rajan Jaisinghani, "Energy Efficient Cleanroom Design Power Point Presentation", For Technocation Systems, Inc., July 2001. |

EXAMINER: DATE CONSIDERED:

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP §609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.